M.5

Electrical measurement and control

CVM Power analyzers

M.5 - CVM Power analyzers

CVMk2
Three-phase power analyzer(balanced and unbalanced) for panel or DIN rail mounting M5-8

CVM NRG 96
Three-phase power analyzer(balanced and unbalanced) for panel mounting M5-14

CVM MINI
Three-phase power analyzer(balanced and unbalanced) for DIN rail mounting M5-16

CVM 96
Three-phase power analyzer(balanced and unbalanced) for panel mounting M5-18

CVM 96
Three-phase power analyzer(balanced and unbalanced) for panel mounting M5-19

CVM 144
Three-phase power analyzer(balanced and unbalanced) for panel mounting M5-20

CVM BD
Three-phase power analyzer(balanced and unbalanced) for DIN rail mounting M5-23

CVM BDM
Three-phase power analyzer(balanced and unbalanced) for DIN rail mounting, with internal 1 MB memory M5-25

Power Net
Three-phase power M5-27
analyzer M5-27

TR8
Multi-channel DC voltage and current analyzer M5-29

Accesories M5-31

CVM Power analyzers

M.5

Nowadays, companies, industries or any consumer of electrical energy are trying to optimise costs to become the most competitive players in the market. We can act over a large number of parameters to save on costs, such as on the consumption of electrical energy.

CIRCUTOR's analyzers offer state-of-the-art technology, measuring a large variety of electrical parameters, with the main purpose of controlling and managing an installation, machine, industry, etc. thus optimising the energy costs.

Definition

The **CVM** series of analyzers includes highly accurate metering stations that are aimed at the control and supervision of the main electrical parameters in three or four-wire, low and high voltage, single and/or three-phase grids. In addition, they offer the most innovative technologies and offer metering in true root mean square. Its indirect current outputs use ITF technologies in the .../5 A secondary or .../1 A secondary: galvanic insulation protection inputs

What functions do CIRCUTOR's analyzers offer?

- They display and transmit all electrical parameters metered and/or calculated.

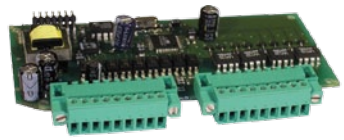
- They incorporate the metering function, storing in the memory the value of energy consumed and generated, even in the absence of an auxiliary power supply. Hourly discriminator with previous programming mode, thus obtaining a totalizer of active, apparent, reactive inductive and reactive capacitive energy, for each rate programmed (depending on the type).They incorporate the maximeter function, calculating the demand integrated in a programmable period (depending on the type). The integration is carried out with a sliding window and it can be carried out over the following adjustable parameters: three-phase current, active three-phase power, apparent three-phase power or current per phase.

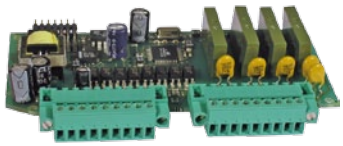
- Some of **CIRCUTOR's** analyzers can be expanded or offer modular capabilities, with additional functions that can be associated to any electrical parameter monitored or calculated, such as:

  - Multi-converter functions: analogue inputs and outputs.

- Alarm station or impulse generation function: digital inputs and outputs. The communications outputs, connection topologies and network protocols can be of different types.

CVMk2





modules CVMk2

- Connections: Ethernet, RS-232, RS-485, Radio
- Protocols: Modbus TCP, Modbus RTU, Profibus DP, Metasys N2 and XML.

INTEGRATION OF COMMUNICATIONS IN ANALYZERS

RS-485 communications can be used to make the most out of **CIRCUTOR's** analyzers with the management software, reading all parameters metered and calculated in real time. The **PowerStudio Scada** software not only displays the electrical parameters in real time, but it also generates a database in the PC, where it stores the log of values, which can be studied later on.

CIRCUTOR offers a range of analyzers, which have Ethernet communications, so they can be connected directly to the intranet and Internet. Therefore, their integration with the **PowerStudio** software is quick and easy.

In addition, **CIRCUTOR** offers Profibus analyzers, which can access a large variety of industrial automation applications, where the protocol is commonly used.

Integration systems (Modbus RTU vs. Modbus TCP)

Until now, **CIRCUTOR** offered and is currently offering Ethernet communication gateways, (Modbus RTU), (TCP2RS code M54031), used for the integration of RS-485 equipment, making use of the Ethernet infrastructures existing in installations. Said gateways were designed for the communication with market SCADAs that did not have the possibility of establishing IP addressing communications, since this was through a virtual port redirectioning software. Another problem with this type of communications was that it was a mono-master system, i.e., communications could only be established with slave equipment, with a single master or control PC. Communications could not be established with other equipment that was not established as a slave.

Fortunately, PLC data acquisition systems and other market masters, as well as the slaves commonly installed in these cases (three-phase power quality analyzers) have been unified under a standardised protocol that is very popular among manufacturers: Industrial Ethernet or Modbus/TCP.The implementation of this system has led to the standardisation of the protocol so that any slave can be queried by various masters at the same time (up to eight), thus multiplying the different and diverse communication topologies in an energy control installation or in any process control situation (multi-master cases).Therefore, **CIRCUTOR** has launched its range of Ethernet analyzers again, implementing the new protocol with the main purpose of standardising the communication methods used by most of the global manufacturers.

- **CVMk2-ITF + k2-EXP-SD-MODBUS/** TCP: Power Quality AnalyzerM54400 / M54402 + Ethernet expanding module (Modbus/TCP) M54504
- **CVM144-ITF-Ethernet-TCP**: Power Quality Analyzer (Modbus/TCP): M50790
- **CVM96-ITF-Ethernet-TCP**: Power Quality Analyzer (Modbus/TCP): M51241
- **TCP2RS**: Converter RS232-RS485 / Ethernet (Modbus/TCP): M54032
- **LM50-TCP**: Alarm / Impulse Centralizer (Modbus/TCP): M54032

With this type of analyzers, the integration of **CIRCUTOR's** units with any market SCADA, PLC or control master is easier and simpler than ever.

ENERGY MANAGEMENT SOFTWARE: Power Studio Scada

Toph-pherformance management software designed for the analysis of the consumption of energy and other parameters metered by **CIRCUTOR's** equipment.

What can this software be used for?

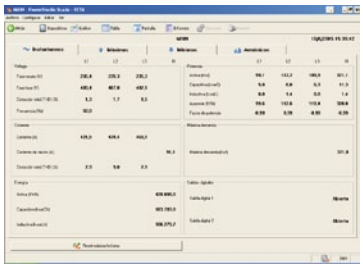
- Control of the energy in an installation, analysing the status of its lines and installations in real time.

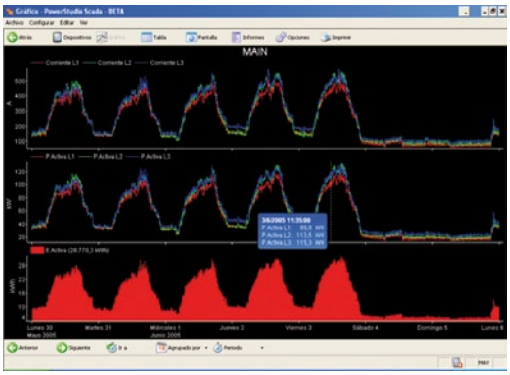
- Simulation of receipts, depending on the version. It can be used to analyse the consumption of energy in the installations with the equipment supplied by **CIRCUTOR** and it also enables the simulation of bills, defining different rates, whether they are regulated or not.

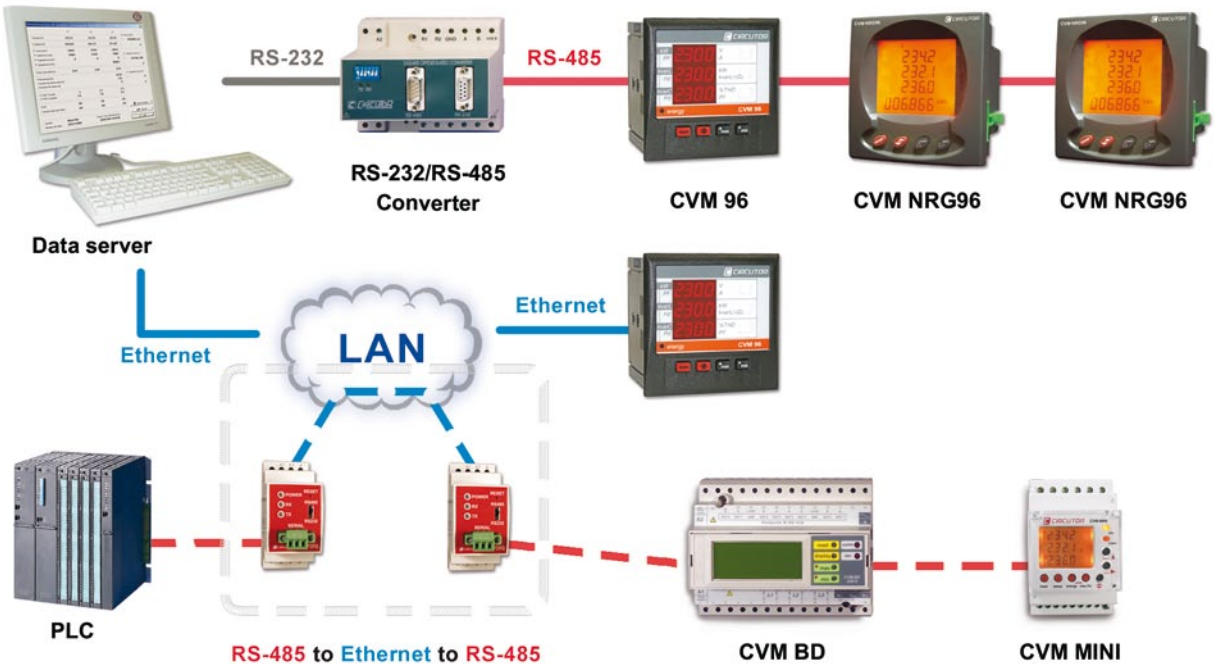
- Study of the evolution of electrical parameters in time, such as: V, A, kW, etc, with graphs and tables. Data and graphs can be exported to draw up reports. Different analyzers can be used to analyse and study the quality parameters defined by the IEC 61000-4-30 Standard.

Applications

Supervision and preventive maintenance of an installation, with the real-time and log of the status and consumption of all sorts of low and medium voltage (LV and MV) machines and installations.







Product selection table

	CVMk2					CVM NRG96				CVM MINI				CVM 96			
METERING FEATURES	L1	L2	L3	N	III	L1	L2	L3	III	L1	L2	L3	III	L1	L2	L3	III
Single phase voltage	*	*	*		*	*	*	*		*	*	*		*	*	*	
Phase-phase voltage	*	*	*			*	*	*		*	*	*		*	*	*	
Vref Voltage (GND)-NEUTRAL				*													
Current	*	*	*	*		*	*	*	**	*	*	*	*	*	*	*	**
Frequency	*					*				*				*			
Active power	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*
Reactive power L	*	*	*		*	*	*	*	*	*	*	*	*	**	**	**	*
Reactive power C	*	*	*		*	*	*	*	*	*	*	*	*	**	**	**	**
Apparent power	*	*	*		*				*	*	*	*	*				*
Power factor	*	*	*		*	*	*	*		*	*	*	*	*	*	*	*
Cos φ	*	*	*		*				*				*				**
Maximum active power demand					*				*				*				*
Maximum apparent power demand					*				*				*				*
Maximum current demand	*	*	*		*		*		*		*		*		*		*
Neutral current			*				*				*				*		
THD Voltage	*	*	*		*	*	*	*		*	*	*		*	*	*	
THD Current	*	*	*		*	*	*	*		*	*	*		*	*	*	
Voltage harmonics (depending on the type (*)	*	*	*	*	50	*	*	*	15	*	*	*	15				
Current harmonics (depending on the type (*)	*	*	*	*	50	*	*	*	15	*	*		15	**	**	**	31
Active energy					*				*				*				*
Reactive energy L					*				*				*				*
Reactive energy C					*				*				*				*
Apparent energy					*				*				*				*
Flicker (WA and PST)	*	*	*														
Factor K (current)	*	*	*														
Peak factor (voltage)	*	*	*														
Unbalance (voltage and current)	*	*	*														
Asymmetry (voltage and current)	*	*	*														
Rates (depending on the type)	9					1				3				1			
Analogue inputs (0/4...20 mA)	*																
Analogue outputs (0/4...20 mA)	*																
Digital inputs	*																
Digital outputs	*					*				*				*			
COMMUNICATIONS FEATURES																	
RS-232																	
RS-485	*					*				*				*			
Ethernet	*													*			
COMMUNICATIONS PROTOCOL																	
Modbus RTU	*					*				*				*			
Modbus TCP	*													*			
Profibus DP																	
Johnson Controls														*			
Compatible with PowerStudio SCADA																	
PAGE	8					14				16				18			

Possible parameters, depending on the unit selected.
*Available for display and communications.
**Available only for communications.
(*)Harmonic decomposition in HAR types.

	CVM 144				CVM BD				CVM BDM				Power Net				
	L1	L2	L3	III	L1	L2	L3	III	L1	L2	L3	III	L1	L2	L3	III	METERING FEATURES
	*	*	*		*	*	*		*	*	*		*	*	*		Single phase voltage
	*	*	*		*	*	*		*	*	*		*	*	*		Phase-phase voltage
																	Vref Voltage (GND)-NEUTRAL
	*	*	*	**	*	*	*	*	*	*	*	*	*	*	*	*	Current
	*				*				*				*				Frequency
	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Active power
	*	*	*	*	*	*	*	*	*	*	*	*				*	Reactive power L
	*	*	*	*	*	*	*	*	*	*	*	*				*	Reactive power C
				**				*				*				*	Apparent power
	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Power factor
				**												*	Cos φ
				*				*				*				*	Maximum active power demand
				*				*				*				*	Maximum apparent power demand
		*		*				*				*				*	Maximum current demand
		*								*							Neutral current
	*	*	*		*	*	*		*	*	*		*	*	*		THD Voltage
	*	*	*		*	*	*		*	*	*		*	*	*		THD Current
									**	**	**	15					Voltage harmonics (depending on the type (*)
	*	*	*	31					**	**	**	15					Current harmonics (depending on the type (*)
				*				*				*				*	Active energy
				*				*				*				*	Reactive energy L
				*				*				*				*	Reactive energy C
				**												*	Apparent energy
									*	*	*						Flicker (WA and PST)
																	Factor K (current)
																	Peak factor (voltage)
																	Unbalance (voltage and current)
																	Asymmetry (voltage and current)
		1				3				1							Rates (depending on the type)
		*															Analogue inputs (0/4...20 mA)
		*				*				*							Analogue outputs (0/4...20 mA)
		*															Digital inputs
		*				*				*							Digital outputs
																	COMMUNICATIONS FEATURES
		*				*				*				*			RS-232
		*				*				*				*			RS-485
		*															Ethernet
																	COMMUNICATIONS PROTOCOL
		*				*				*							Modbus RTU
		*															Modbus TCP
		*															Profibus DP
		*				*											Johnson Controls
		*												*			Compatible with PowerStudio SCADA
		20				23				25				27			PAGE

Possible parameters, depending on the unit selected.
*Available for display and communications.
**Available only for communications.
(*)Harmonic decomposition in HAR types.

CVMk2

Three-phase power analyzer(balanced and unbalanced) for panel or DIN rail mounting

Description

Three-phase power analyzer (balanced and unbalanced) for its assembly on panel or DIN rail mounting with a graphical display. measuring in 4 quadrants.

Other features include:

- Class 0.2 or 0.5 power and energy
- Measuring of Class B supply quality events (guaranteeing the power supply of the unit with an UPS, battery, etc.)
- Current measuring .../5 or .../1 A
- Measure of neutral current with transformer
- Optional energy consumption and generation billing (up to 9 rates)
- RS-485 Modbus/RTU Communications
- Expansion possibilities (up to 3 modules)
- Backlit VGA graphical display
- Instantaneous display of maximum and minimum electrical parameters with date and hour
- Measure of energy consumed and generated, up to 100 GW·h
- Universal series power supply
- With ITF technology: galvanic insulation protection inputs

Application

- Applied to the control of general switchboards and low, medium and high voltage connection points
- Alarm station with voltage-free digital inputs
- Submetering station: impulse meter with other types of consumption, such as gas, water, steam, etc. with their digital inputs
- Measuring converter: optional association of an instantaneous parameter to one of the analogue outputs available (0...20 mA / 4...20 mA)
- Instantaneous, maximum and minimum parameter recording unit, with date and hour and an expandable memory card
- Power quality analyzer: harmonic decomposition up to order 50º, asymmetries, flicker, unbalances, overvoltages, gaps, interruptions, etc.

Features

Power supply circuit	85...265 Vac / 90...300 Vdc
ac Power supply frequency	50..0.60 Hz
ac Power supply consumption	30 V·A
dc Power supply consumption	< 25 W
Metering circuit	
Nominal voltage	300/500 V ph-n / V ph-ph or 500/866 V ph-n / V ph-ph
Frequency	45..0.65 Hz
Metering margin	5...120 % of the U_n for U_n= 300 Vac (ph-n) 5...120 % of the U_n for U_n= 500 Vac (ph-n)
Maximum metering voltage	360 Vac
Admissible overvoltage	750 Vac
Maximum consumption (limited current)	< 0.6 V·A
Current measuring circuit	
Nominal current	.../5 A or .../1 A
Metering margin	1..0.120 % of I_n for I_n = 5 A
Primary current metered	Programmable <30,000 A
Admissible overload	6 A permanent, 100 A t < 1 s
Consumption	< 0.45 V·A
Maximum meter value	100 GW·h
Class/Accuracy	0.2 or 0.5 power and energy
Ambient conditions	
Operating temperature	-10 ... +50 ºC
Relative humidity	5 ... 95%
Build features	
Metering module	Assembly on DIN Rail 46277 (EN 50022)
Screen or screen + metering module	Assembly on panel (96 x 96 mm, 144 x 144 mm) or opening with a 103 mm diameter
External dimensions	144 x 144 x 116 mm
Safety	
Designed for CAT III 300/520 Vac installations, in accordance with **EN 61010** Double-insulated electric shock protection, class II	
Standards	
IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-11, IEC 61000-4-4, IEC 61000-4-5	

CVMk2

Three-phase power analyzer(balanced and unbalanced) for panel or DIN rail mounting

References

Compact units (metering + display module)

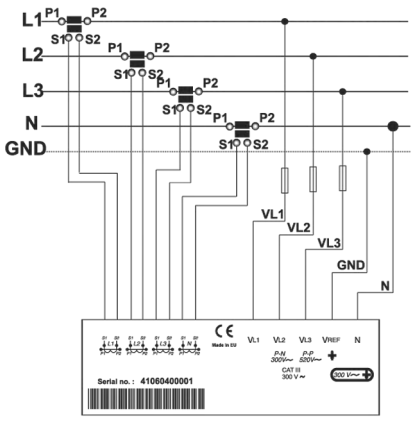
Quadrants	Class	Communications MODBUS / RTUProtocol	Neutral current	Universal power supply	Type	Code
4	0,5	RS-485	Yes	Yes	**CVMk2-ITF-405**	**M54400**
4	0,5	RS-485	Yes	Yes	**CVMk2-ITF-402**	**M54402**

Measuring units (measuring module)

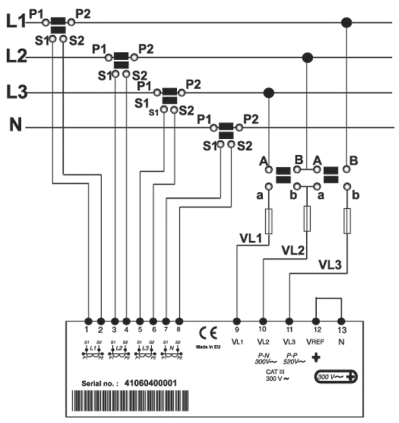
Quadrants	Class	Communications MODBUS / RTUProtocol	Neutral current	Universal power supply	Type	Code
4	0,5	RS-485	Yes	Yes	**M-CVMk2-ITF-405**	**M54410**
4	0,5	RS-485	Yes	Yes	**M-CVMk2-ITF-402**	**M54412**

Connections

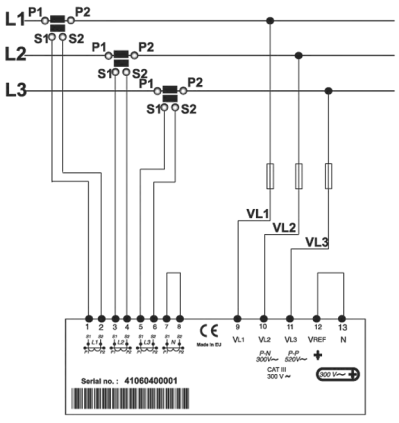
Connection of 4 Current transformers (5 wires)



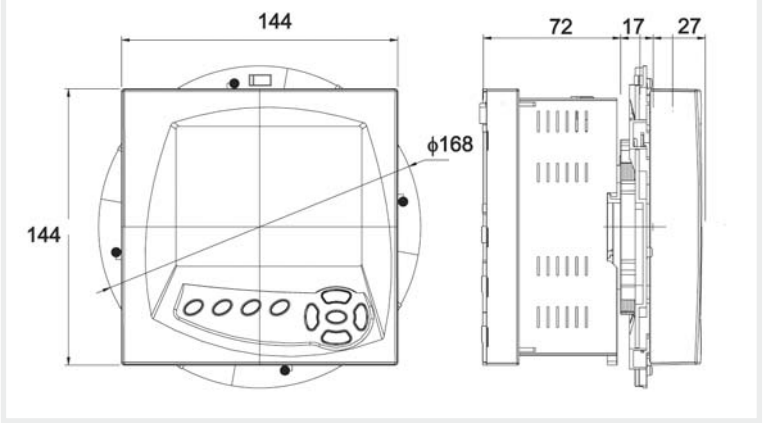
Connection of 4 Current transformers and 2 voltage transformers



Connection of 3 Current transformers (3 wires)



Dimensions



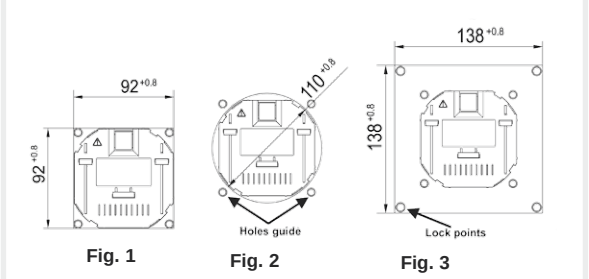
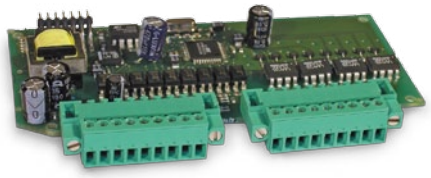


Fig. 1 Fig. 2 Fig. 3

Figures 1, 2 and 3: Display of the frontal panel part embedding (display) in a 92 x 92 mm opening, with a diameter of 110 mm and 138 x 138 mm, respectively

Exchangeable modules

CVM k2



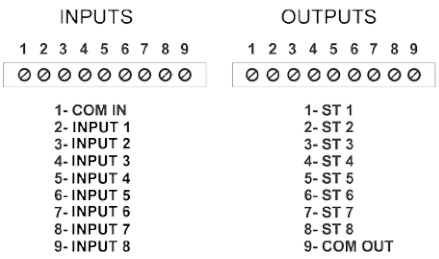
1. k2-EXP-8I / 8O-Digital-TR Card

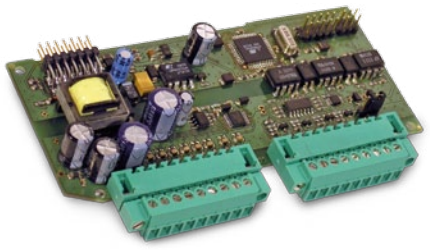
Card with 8 digital inputs and 8 digital outputs. Outputs with optocoupled transistor

Features

Features	
Logical inputs	
Type of input	Voltage-free
Type of coupling	Optoinsulated
V max	24 Vdc
minimum t ON / t OFF	t ON 40 ms
	t OFF 40 ms
Static outputs	
AC Voltage	<100 Vac
Non-repetitive Peak voltage	350 V pk.
Nominal current	100 mA
Repetitive current during t=1s	120 mA
Maximum current t=10 ms	350 mA
Connection	
Rigid conductor section	0.05...1 mm^2
Code	**M54501**

Connection





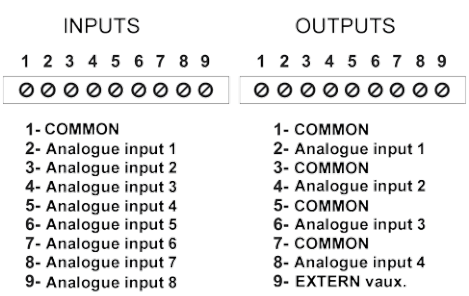
2. k2-EXP-8I / 4O-Analogue Card

Card with 8 digital inputs and 4 digital outputs

Features

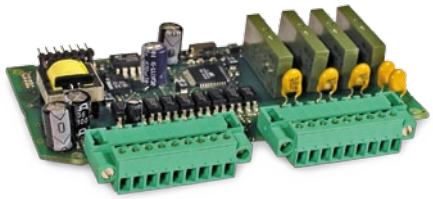
Features	
Analogue outputs	
Maximum internal voltage	20 / 24 Vdc
Output range	0 / 4...20 mA
Linearity	1 %
Load resistance	< 500 ohm
Output range	4000 points
Analogue inputs	
Type of metering	-
Input range	0 / 4...20 mA
Metering accuracy	1 %
Input impedance	200 ohm
Connection	
Rigid conductor section	0.05...1 mm^2
Code	**M54502**

Connection



Exchangeable modules

CVM k2



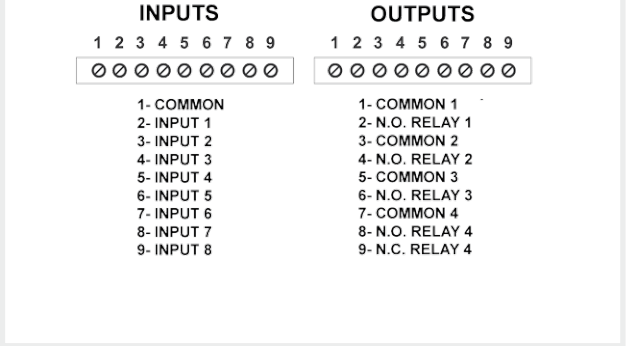
3. k2-EXP-8I / 4O-Digital-RL Card

Card with 8 digital inputs and 4 digital outputs. Outputs with relay.

Features

Features	
Logical inputs	
Type of input	Voltage-free
Type of coupling	Optoinsulated
V max	24 Vdc
minimum t ON / t OFF	t ON 40 ms
	t OFF 40 ms
Relay outputs	
AC Voltage	250 Vac
AC Current	6 Aac
Minimum relay load	1 Vac
	0.001 Aac
Mechanical working life	5 x 10^6 operations
Electrical working life	NO: 5x10^4, NC: 3x10^4 cycles
Connection	
Rigid conductor section	0.05...1 mm^2
Code	**M54503**

Connection

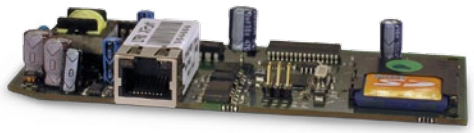


4. k2-EXP-SD-MODBUS/TCP Card

Ethernet communications card and SD memory

Features

Ethernet output	
Network Protocol	Ethernet RJ-45
Communication protocol	Modbus / TCP
Speed	compatible with 10 base T / 100 base Tx
SD Card	
Type of card	SD
Maximum capacity	2 Gb
Format	FAT 16
Code	**M54504**



Recommendations

- The unit is formatted automatically when installing an SD card. Do not install cards with contents stored that you wish to keep.
- To remove the SD card safely, interrupt the communications between the unit and the memory. There are two ways to do so; either turning the unit off or accessing the card setup menu.

Icons

- Correct SD memory state
- Incorrect SD memory state
- SD Card removal enabled

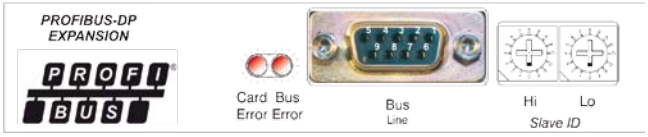
Exchangeable modules
CVM k2

5. PROFIBUS Card

GSD Modules

The GSD modules are configured in accordance with the following table. The table shows the module number, content (variables) and the total size of the module.

Mod.	Parameters	Byte	Size
1	Simple voltages	12	52
	Phase currents	12	
	Compound voltages	12	
	Power factor	12	
	Frequency	4	
2	Power ratings	48	48
3	Mean values	12	44
	Neutral values	8	
	Three-phase values	24	
4	Current energy with no billing	48	48
5	THD *U* / *I*	32	32
6	THD odd / even	64	64
7	Unbal / Asymmetry / Flicker	44	44
8	Odd harmonics, Voltage (15º)	72	72
9	Even harmonics, Current (15º)	72	72
10	Digital I. 1 / Analogue I. 2	64	64
11	Digital I. 2 / Analogue I. 3	64	64
12	Digital I. 3 / Analogue I. 1	64	64
13	Cos φ	12	12

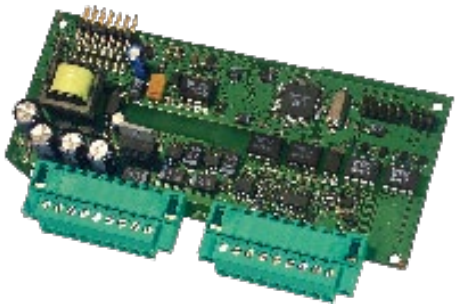


Code	M5450A

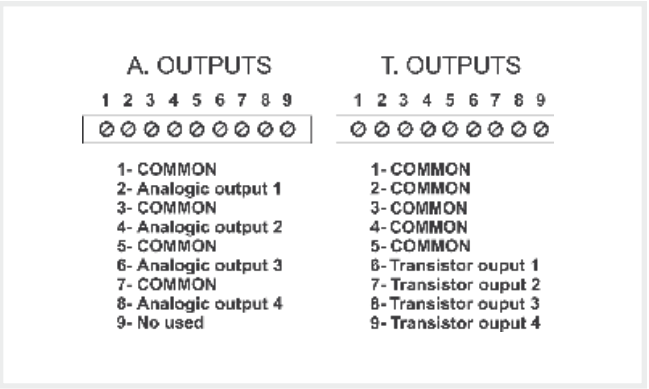
6. Exp. Card 4 S analogue + 4 S static. ±5 mA

Features

Features	
Logical outputs	
Output range	±5 mA
Linearity	1 %
Load resistance	< 1000
Output range	4000 points
Static outputs	
Voltage	<100 Vac/Vdc
Non-repetitive Peak voltage	350 V pk.
Nominal current	100 mA
Repetitive current during *t*=1s	120 mA
Maximum current *t*=10 ms	350 mA
Connection	
Rigid conductor section	0.05...1 mm²
Code	**M54507**



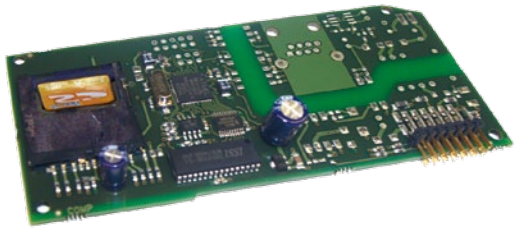
Connection



Exchangeable modules
CVM k2

7. k2-EXP-SD Card

Ethernet communications card and SD memory



Features

SD Card	
Type of card	SD
Maximum capacity	2 Gb
Format	FAT 16
Code	**M54506**

Recommendations

Card used to record up to 400 electrical variables coming from a CVMk2 power quality analyzer. It also includes a log of the quality events: overvoltages, voltage interruptions or gaps.

Icons

- Correct SD memory state
- Incorrect SD memory state
- SD Card removal enabled

CVM NRG 96

Three-phase power analyzer(balanced and unbalanced) for panel mounting

Description

Three-phase power analyzer(balanced and unbalanced) for its assembly on panels with a minimum depth, measuring in 4 quadrants.

- Other features include:Class 0.5 energy
- Current measure .../5
- RS-485 Modbus/RTU Communications, depending on the type
- Instantaneous, maximum and minimum parameter display
- Digital output with optoinsulated transistor
- ITF Technology: Galvanic insulation protection inputs inputs, depending on the type
- Maximeter function (A / A III / kW III / kV·A III)
- Default page selection
- Universal power supply for Plus types

Application

- Applied to the control of switchboards and low and medium voltage connection points.
- Alarm control, with full programming of the variable controlled, maximum and minimum values and the delay
- Control of active or reactive energy with pulses
- Control of instantaneous, maximum and minimum values of the electrical parameters metered

Features

Power supply circuit	**dc Version**	**Plus Version**: ac and dc
	24 Vdc (-15...+10%)	85...265 V ac / 95...300 V dc
AC Power supply frequency	-	50...60 Hz (ac type)
Maximum consumption (equipment with communications)	2.2 W	2 V·A
DC Power supply consumption (equipment w/o communications)	1.8 W	2 V·A
Metering circuit		
Nominal voltage	300 Vac (ph-n) / 520 Vac (ph-ph)	
Frequency	45..0.65 Hz	
Nominal current	I_n .../ 5 A	
Current consumption of the circuit	0.75 V·A	
Overload (permanent)	1.1 I_n	
Class/Accuracy		
Voltage	0.5 % ± 2 digits	
Current	0.5 % ± 2 digits	
Power rating	1 % ± 2 digits	
Ambient conditions		
Operating temperature	-10 ... +50 ºC	
Relative humidity	5 ... 95%	
Output transistor	Optoinsulated (collector open) NPN	
Maximum switching voltage	24 Vdc	
Maximum switching current	50 mA	
Maximum impulse frequency	5 impulse / s	
Duration of the impulse	100 ms	
Build features		
Type of box	VO self-extinguishing plastic	
Degree of protection	Fitted unit (frontal): IP 51 Non-fitted unit (sides and rear cover): IP 31	
Dimensions	96 x 96 x 63 mm	
Safety		
Designed for CAT III 300/520 Vac installations, in accordance with **EN 61010**. Double-insulated electric shock protection, class II		
Standards		
IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN 61010-1		

CVM NRG 96

Three-phase power analyzer(balanced and unbalanced) for panel mounting

References

Quadrants	Class (V, A)	Communications MODBUS / RTUProtocol	Digital output	Universal power supply	Harmonics	Type	Code
4	0,5	-	-	Yes	-	**CVM-NRG 96**	**M51800**
4	0,5	-	-	Yes	-	**CVM-NRG 96-ITF**	**M51900**
4	0,5	RS-485	1	Yes	-	**CVM-NRG 96-ITF, RS485 C**	**M51911**
4	0,5	RS-485	1	Yes	*U* and *I* (15º)	**CVM-NRG 96-ITF-HAR, RS485 C**	**M51B11**
CVM NRG96-MC, Sistemas de medida Eficiente							
4	0,5	-	-	Si	-	**CVM NRG96-MC-ITF**	**M52070**
4	0,5	RS-485	1	Si	-	CVM NRG96-MC-ITF-RS485-C2	**M52081**

TRANSFORMADORES EFICIENTES monofásicos MC1 y trifásicos MC3, Serie MC

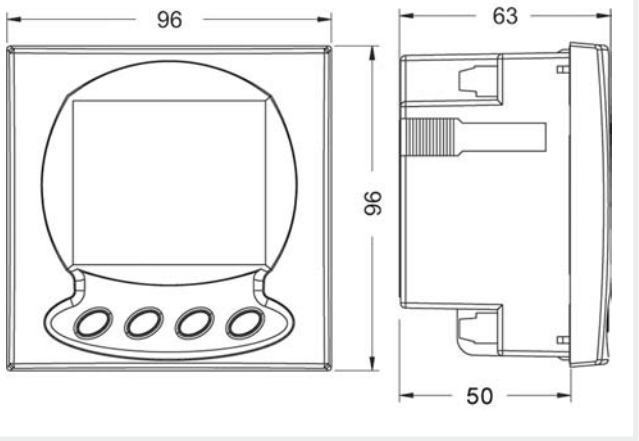
Max. A	Ranges	Class 0,5 Power	Measurement	Internal diameter		Type	Code
63	-	0,1 VA	3 Phases	7,1 mm		**MC3-63**	**M73121**
125	-	0,1 VA	3 Phases	14,6 mm		**MC3-125**	**M73122**
250	150/200/250	0,25 VA	1 Phase	20 mm		**MC1-20-150/200/250**	**M73113**
500	250/400/500	0,25 VA	1 Phase	30 mm		**MC1-30-250/400/500**	**M73114**

Coding table

M	5	X	X	X	X	0	0	X
Code						Internal Code		↑

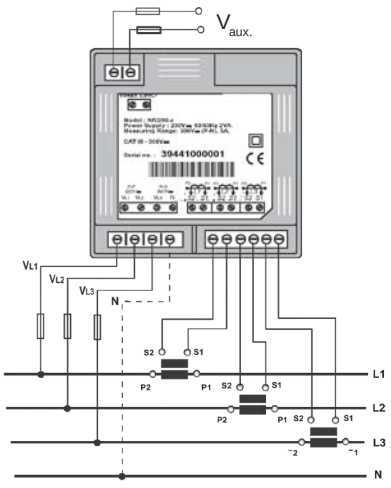
Power Supply Voltage (PSV)	Standard (230 Vac)	0
	85...265 Vac 95...300 Vdc	A
	24..0.120 Vdc	5

Dimensions

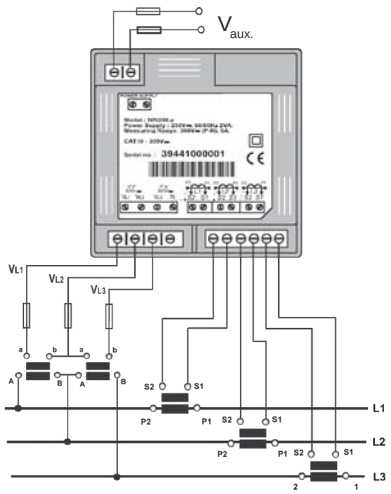


Connections

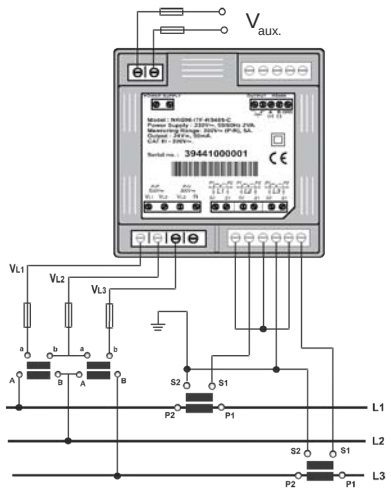
CVM NRG96, 3 or 4 wires (low voltage)



CVM NRG96, 3 wires (2 Voltage transformers and 3 Current transformers)



CVM NRG96, 3 wires (2 Voltage transformers and 2 Current transformers)



CVM MINI

Three-phase power analyzer(balanced and unbalanced) for DIN rail mounting

Description

Three-phase power analyzer(balanced and unbalanced) for its assembly on DIN rails with very small dimensions, measuring in 4 quadrants.

Other features include:

- Current measuring .../5 or .../1 A
- DIN rail format with only 3 modules
- Assembly on the 72 x 72 mm panel with frontal adaptor (cod. M5ZZF1)
- RS-485 Communications (Modbus-RTU)
- Two transistor outputs
- ITF technology: galvanic insulation protection inputs inputs, depending on the type
- Selection of parameters displayed
- Default page selection
- Universal power supply for the Plus type
- Sealable

Application

- Application for the control of switchboards and low and medium voltage connection points, where an analyzer must be installed on the DIN rail due to space restrictions.
- Control of instantaneous, maximum and minimum values of the electrical parameters metered.

Features

Power supply circuit	230 V ac (-15...+10%) Plus: 85..0.265 V ac / 95...300 V dc
Consumption	3 V·A
Frequency	45...65 Hz
Metering circuit	
Nominal voltage	300 V ac (ph-n) / 520 Vac (ph-ph)
Frequency	40..0.65 Hz
Voltage consumption of the circuit	0.7 V·A
Current consumption of the circuit	ITF 0.9 / Shunt 0.75 V·A
Overload (permanent)	1.2 I_n
Class/Accuracy	
Voltage	0.5 % ± 1 digit
Current	0.5 % ± 1 digit
Power rating	1 % ± 1 digit
Ambient conditions	
Operating temperature	-10 ... +50 ºC
Relative humidity (non-condensing)	5 ... 95%
Output transistor	Optoinsulated (collector open) NPN
Maximum switching voltage	24 V dc
Maximum switching current	50 mA
Maximum impulse frequency	5 impulse / s
Duration of the impulse	100 ms
Build features	
Type of box	VO self-extinguishing plastic
Degree of protection	Embedded equipment: IP 41 Terminals: IP 20
Dimensions	52.5 x 85 x 67.9 mm (3 modules)
Weight	210 g
Safety	
Designed for CAT III 300/520 Vac installations, in accordance with **EN 61010**. Double-insulated electric shock protection, class II	
Standards	
IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN 61010-1	

CVM MINI

Three-phase power analyzer(balanced and unbalanced) for DIN rail mounting

References

Quadrants	Class (V, A)	Communications	Protocol	Digital output	Harmonics	Type	Code
4	0,5	-	-	-	-	**CVM-MINI**	**M52000**
4	0,5	-	-	-	-	**CVM-MINI-ITF**	**M52010**
4	0,5	RS-485	MODBUS / RTU	2	-	**CVM-MINI-ITF-RS485-C2**	**M52021**
4	0,5	RS-485	MODBUS / RTU	2	V and I (15º)	**CVM-MINI-ITF-HAR-RS485-C2**	**M52031**
CVM MINI-MC, Efficient measuring Systems							
4	0,5	-	-	Si	-	**CVM MINI-MC-ITF**	**M52070**
4	0,5	RS-485	1	Si	-	CVM MINI-MC-ITF-RS485-C2	**M52081**

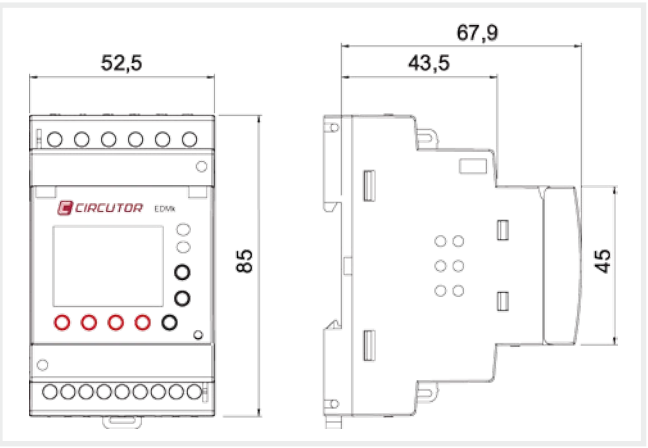
MC1 single-phase and MC3 three-phase Efficient Transformers, MC Series

Max. A	Ranges	Class 0,5 Power	Measurement	Internal diameter		Type	Code
63	-	0,1 VA	3 phase	7,1 mm		**MC3-63**	**M73121**
125	-	0,1 VA	3 phase	14,6 mm		**MC3-125**	**M73122**
250	150/200/250	0,25 VA	1 phase	20 mm		**MC1-20-150/200/250**	**M73113**
500	250/400/500	0,25 VA	1 phase	30 mm		**MC1-30-250/400/500**	**M73114**

Coding table

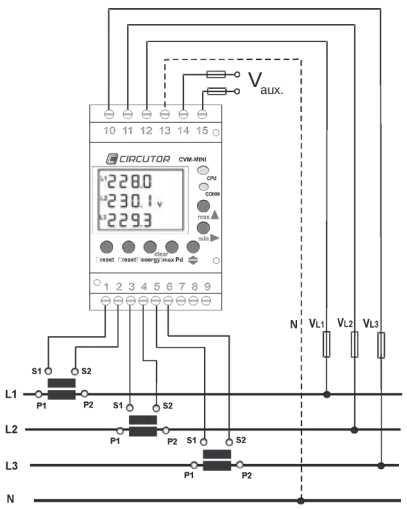
M	5	X	X	X	X	0	0	X
Code						Internal Code		↑
Power Supply Voltage (PSV)					Standard 230 Vac			0
					85...285 Vac 95...300 Vdc			C

Dimensions

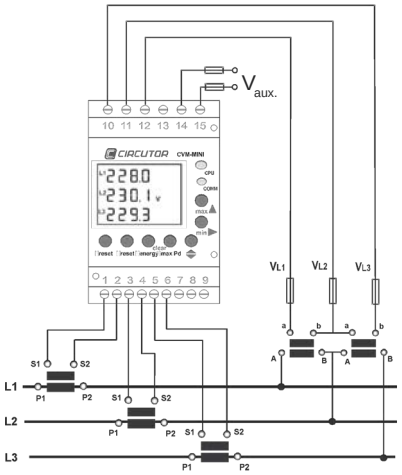


Connections

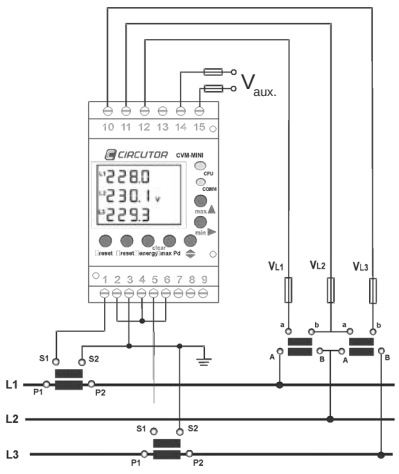
CVM MINI, 3 or 4 wires (low voltage)



CVM MINI, 3 wires (2 Voltage transformers and 3 Current transformers)



CVM MINI, 3 wires (2 Voltage transformers and 3 Current transformers)



CVM 96

Three-phase power analyzer(balanced and unbalanced) for panel mounting

Description

Three-phase power analyzer(balanced and unbalanced) for its assembly on 96 x 96 mm panels, measuring in 2 quadrants.

Other features include:

- Current measuring .../5
- Communication protocol: Modbus RTU, Modbus TCP, Johnson Controls
- Connections: RS-232, RS-485, Ethernet
- 2 relay outputs
- ITF Technology: galvanic insulation protection inputs inputs, depending on the type
- Maximeter function (A / A III / kW III / kV·A III)
- Default page selection
- Metering ranges: 110, 520, 866 Vf-f
- Detection of incorrect connections

Application

- Applied to the control of switchboards and low and medium voltage connection points.
- Control of alarms; the variable controlled, maximum and minimum values and delay variables are fully programmable.
- Control of instantaneous values and storage of maximum and minimum values of the electrical parameters metered.

Features

Power supply circuit	230 Vac (-15...+10%). For other values, see the coding table
Consumption	5 V·A
Frequency	45..0.65 Hz
Metering circuit	
Nominal voltage	300 Vac (ph-n) / 520 Vac (ph-ph)
Frequency	45...65 Hz
Current consumption of the circuit	0.75 V·A
Nominal current	... / 5 A
Overload (permanent)	1.2 I_n
Class/Accuracy	
Voltage	0.5 % ± 2 digits
Current	0.5 % ± 2 digits
Power ratings	1 % ± 2 digits
Type of output	Relay
Maximum switching voltage	250 Vac
Maximum switching current	3 A
Mechanical working life	3 x 10^7 operations
Maximum impulse frequency	1 impulse / s
Ambient conditions	
Operating temperature	-10 ... +50 ºC
Relative humidity (non-condensing)	5 ... 95%
Build features	
Type of box	VO self-extinguishing plastic
Degree of protection	Fitted unit (frontal): IP 54 Non-fitted unit (sides and rear cover): IP 31
Dimensions	96 x 96 x 78 mm
Weight	520 g.
Safety	
Designed for CAT III 300/520 Vac installations, in accordance with **EN 61010** Double-insulated electric shock protection, class II	
Standards	
IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN 61010-1	

CVM 96

Three-phase power analyzer(balanced and unbalanced) for panel mounting

References

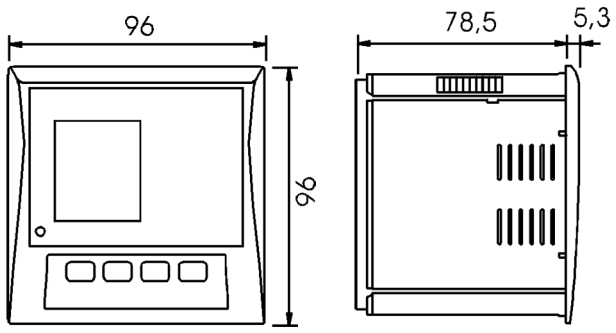
Quadrants	Class (V,A)	Communications	Protocol	Relay output	Harmonics	Current neutral	Type	Code
2	0,5	-	-	-	-	-	**CVM 96**	**M51100**
2	0,5	-	-	-	-	-	**CVM 96-ITF**	**M51200**
2	0,5	RS-485	Modbus / RTU	2	-	-	**CVM 96-ITF-RS485-C2**	**M51211**
2	0,5	Ethernet	Modbus / TCP	2	-	-	**CVM 96-ITF-Ethernet-C2**	**M51231**
2	0,5	RS-485	Johnson Controls	2	-	-	**CVM 96-ITF-Johnson-C2**	**M51711**
2	0,5	RS-485	Modbus / RTU	2	A (31º)	Yes	**CVM 96-F- ITF-RS485-C2-HAR-IN**	**M51513**

Coding table

M	5	X	X	X	X	0	0	X	X	X
Code						Internal Code				

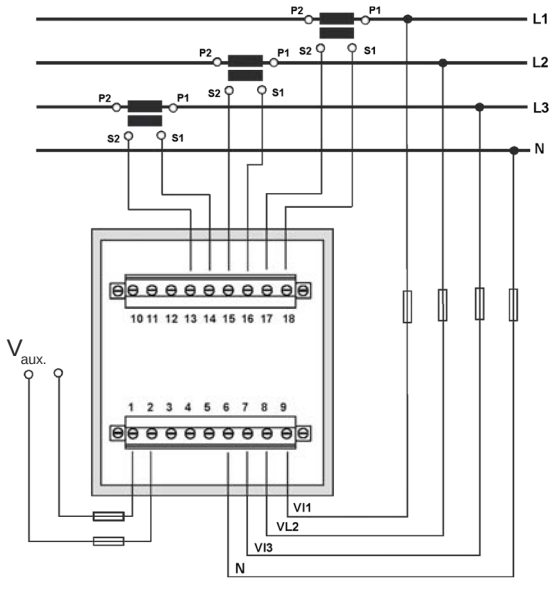
Power Supply Voltage (PSV)	Standard (230 V ac)	0	
	110 V ac	1	
	400 V ac	3	
	480 V ac	4	
	24..0.120 V dc	5	
Voltage metered (VM)	Standard (300 V_{ph-n}/520 V_{ph-ph})		0
	63.5 V_{ph-n} / 110 V_{ph-ph}		1
	500 V_{ph-n} / 866 V_{ph-ph}		3
Current input (CI)	Standard (.../ 5 A)		0
	.../ 1 A (Only ITF)		1

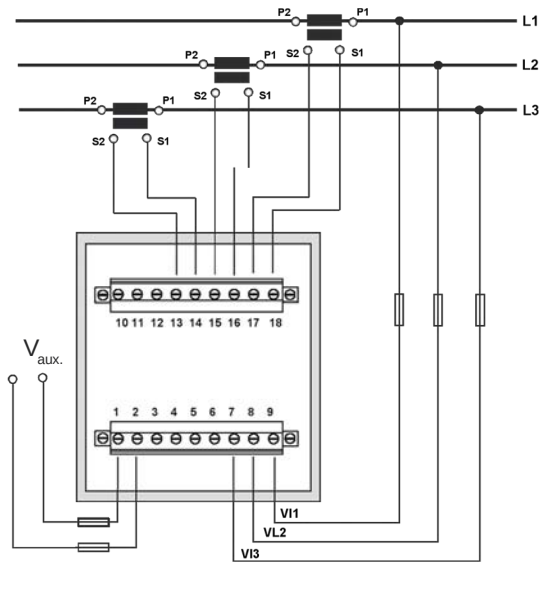
Dimensions



Window: $92^{+0.8}$ x $92^{+0.8}$ mm

Connections





See the user manual for other types of connections

CVM 144

Three-phase power analyzer(balanced and unbalanced) for panel mounting

Description

Three-phase power analyzer(balanced and unbalanced) for its assembly on 144 x 144 mm panels, measuring in 2 quadrants.

Other features include:

- Current measuring .../5 A
- Communication protocol: Modbus RTU, Modbus TCP, Johnson Controls
- Connections: RS-232, RS-485, Ethernet.
- Expandable input/output modules
- ITF Technology: galvanic insulation protection inputs inputs, depending on the type.
- Maximeter function (A / A III / kW III / kV·A III).
- Default page selection
- Varied measuring ranges (110, 520, 866 V ph-ph)
- Incorrect connection detection (LED flashing).

Application

- Applied to the control of switchboards and low and medium voltage connection points
- Alarm station, fully programmable variables controlled, maximum value, minimum value and delay
- Control of instantaneous values, maximum and minimum values of the electrical parameters metered
- Multiple-converter function with its analogue outputs 0/4..20 mA
- Leakage current and neutral metering function

Features

Power supply circuit		230 Vac (-15...+10%). For other values, see the coding table
Consumption		5 V·A
Frequency		45..0.65 Hz
Metering circuit		
Nominal voltage		300 Vac (ph-n) / 520 Vac (ph-ph)
Frequency		45..0.65 Hz
Current consumption of the circuit		0.75 V·A
Nominal current		... / 5 A
Overload (permanent)		1.2 I_n
Class/Accuracy		
Voltage		0.5 % ± 2 digits
Current		0.5 % ± 2 digits
Power ratings		1 % ± 2 digits
Type of output		Relay
Maximum switching voltage		250 V ac
Maximum switching voltage		750 V·A
Maximum switching current		3 A
Mechanical working life		3 x 10^7 operations
Maximum impulse frequency		1 impulse / s
Ambient conditions		
Operating temperature		-10 ... +50 ºC
Relative humidity (non-condensing)		5 ... 95%
Build features		
Type of box		VO self-extinguishing plastic
Degree of protection	Fitted unit (frontal)	IP 54
	Non-fitted unit (sides and rear cover)	IP 31
Dimensions		144 x 144 x 76 mm
Weight		400 g
Safety		
Designed for CAT III 300/520 Vac installations, in accordance with **EN 61010** Double-insulated electric shock protection, class II		
Standards		
IEC 664, VDE 0110, UL 94, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN 61010-1		

CVM 144

Three-phase power analyzer
(balanced and unbalanced) for panel mounting

References

Quadrants	Class (V,A)	Communications	Protocol	Digital outputs	Analogue outputs	Digital inputs	Analogue inputs	Harmonics	Current leakages / neutral	Type	Code
EXPANDABLE EQUIPMENT											
2	0,5	-	-	-	-	-	-	-	-	**CVM 144**	**M50600**
2	0,5	-	-	-	-	-	-	-	-	**CVM 144-ITF**	**M50700**
2	0,5	-	-	-	-	-	-	A (31º)	-	**CVM 144-ITF-HAR**	**M50A60**
2	0,5	Ethernet	Modbus / TCP	-	-	-	-	-	-	**CVM 144-ITF-Ethernet-TCP**	**M50790**
2	0,5	RS-485	Profibus DP	-	-	-	-	-	-	**CVM 144-ITF-Profibus**	**M50730**
2	0,5	RS-485	Johnson Controls	-	-	-	-	-	-	**CVM 144-ITF-Johnson Controls**	**M50C10**
EXCHANGEABLE MODULES (for expandable equipment)											
-	-	-	-	2	-	-	-	-	Yes	**CVM 144-C2-Currents Module**	**M51001**
-	-	RS-485	Modbus / RTU	2	-	-	-	-	-	**CVM 144-RS485-C2 Module**	**M51010**
-	-	RS-485	Modbus / RTU	2	-	-	-	-	Yes	**CVM 144-RS485-C2-Currents Module**	**M51011**
-	-	RS-485	Modbus / RTU	2	-	4	-	-	-	**CVM 144-RS485-C2-Digital Module**	**M51016**
-	-	RS-232	Modbus / RTU	2	-	-	-	-	-	**CVM 144-RS232-C2 Module**	**M51020**
COMPLETE EQUIPMENT											
2	0,5	RS-485	Modbus / RTU	2	-	-	-	-	-	**CVM 144-ITF-RS485-C2**	**M50710**
2	0,5	RS-485	Modbus / RTU	2	4	-	-	-	-	**CVM 144-ITF-RS485-C2-A4O**	**M50A14**
2	0,5	RS-485	Modbus / RTU	2	2	-	2	-	-	**CVM 144-ITF-RS485-C2-A2I/2O**	**M50A18**
2	0,5	Ethernet	Modbus / TCP	2	2	-	2	-	-	**CVM 144-ITF-Ethernet-C2-A2I/2O-TCP**	**M50A98**
2	0,5	Ethernet	Modbus / TCP	2	-	-	-	-	Yes	**CVM 144-ITF-Ethernet-C2-currents-TCP**	**M50791**
2	0,5	RS-485	Profibus DP	2	2	-	2	-	-	**CVM 144-ITF-Profibus-C2-A2I/20**	**M50A38**
2	0,5	RS-485	Profibus DP	2	-	-	-	-	Yes	**CVM 144-ITF-Profibus-C2-Currents**	**M50741**
2	0,5	RS-485	Johnson Controls	2	-	-	-	-	Yes	**CVM 144-ITF-Johnson Controls-C2-currents**	**M50C11**

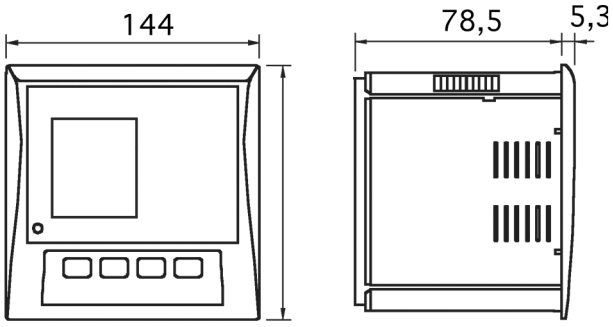
CVM 144

Three-phase power analyzer
(balanced and unbalanced) for panel mounting

Coding table

M	5	X	X	X	X	0	0	X	X	X
Code						Internal Code		↑	↑	↑
Power Supply Voltage (PSV)			Standard (230 V ac)					0		
			110 V ac					1		
			400 V ac					3		
			480 V ac					4		
			24..0.120 V dc					5		
Voltage metered (VM)			Standard (300 V_{ph-n}/520 V_{ph-ph})						0	
			63.5 V_{ph-n} / 110 V_{ph-ph}						1	
			500 V_{ph-n} / 866 V_{ph-ph}						3	
Current input (CI)			Standard (.../ 5 A)							0
			.../ 1 A (Only ITF)							1

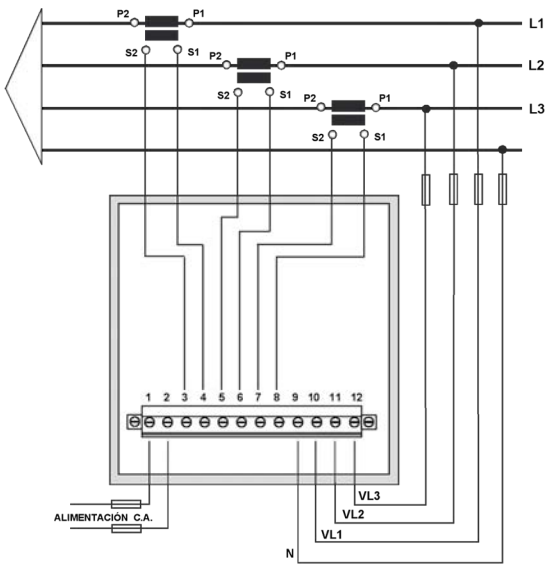
Dimensions



Window: $138^{+0.8}$ x $138^{+0.8}$ mm

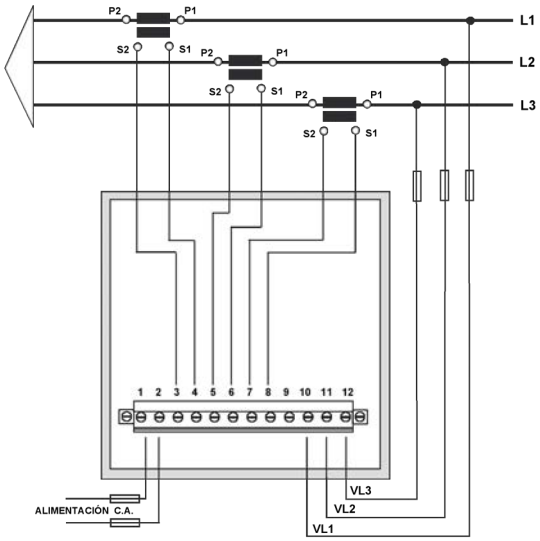
Connections

CVM 144



Three-phase networks - 4 wires (low voltage)

CVM 144

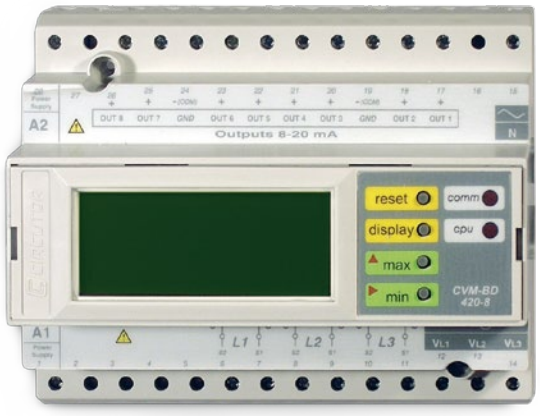


Three-phase networks - 3 wires (low voltage)

See the user manual for other types of connections

CVM BD

Three-phase power analyzer(balanced and unbalanced) for DIN rail mounting



Description

Three-phase electrical network analyzer (balanced and unbalanced) assembled on DIN rail, measuring in 4 quadrants (consumption and generation).

Other features include:

- Current measuring .../5 or .../1 A
- Measuring of active (kW·h) and reactive (kvarh) energy consumed and generated, both capacitive and inductive. (4 quadrants)
- 8 module DIN Rail format
- Adjustable dual kW/MW scale
- Modbus -RTU Communications protocol
- Optional second RS-485 port to connect I/O peripherals, depending on the type.
- ITF Technology: galvanic insulation protection inputs, depending on the type
- Selection of the parameters displayed
- Selection of the default page
- Internal clock used to program and classify the three hourly rates

Application

- Application for the control of switchboards and low and medium voltage connection points, where an analyzer must be installed on the DIN rail
- Control of instantaneous, maximum and minimum values of the electrical parameters metered
- Alarm station of alarms with analogue signal
- Rate establishing control for up to three different rates

Features

Power supply circuit	230 Vac (-15...+10%) For other values, see the coding table
Consumption	6 V·A
Frequency	45..0.65 Hz
Metering circuit	
Nominal voltage	500 Vac (ph-n) / 866 Vac (ph-ph)
Frequency	40..0.65 Hz
Current consumption of the circuit	0.6 V·A
Nominal current	... / 5 A
Overload (permanent)	1.2 I_n
Class/Accuracy	
Voltage	0.5 % ± 2 digits
Current	0.5 % ± 2 digits
Power rating	1 % ± 2 digits
Ambient conditions	
Operating temperature	-10 ... +50 ºC
Relative humidity (non-condensing)	5 ... 95%
Build features	
Type of box	VO self-extinguishing plastic
Degree of protection	Embedded equipment: IP 41 Terminals: IP 20
Dimensions	140 x 110 x 70 mm (3 modules)
Weight	520 g
Safety	
Designed for CAT III 300/520 Vac installations, in accordance with **EN 61010** Double-insulated electric shock protection, class II	
Standards	
IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN 61010-1	

CVM BD

Three-phase power analyzer
(balanced and unbalanced) for DIN rail mounting

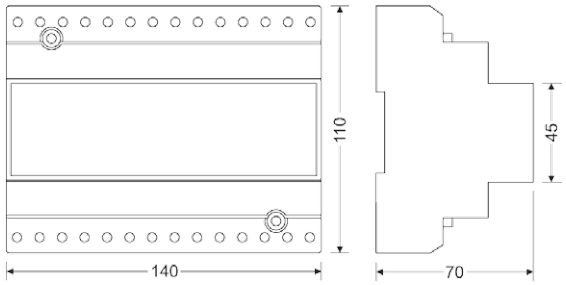
References

Quadrants	Class (V/A)	Clock	THD/D (V,A)	Maximum demand	MODBUS / RTU Communications	RED Communications	Relay output	Output 4...20 mA	Type	Code
4	0,5	Yes	Yes	Yes	RS-485	RS-485	-	-	**CVM-BD-RED-H**	**M52110**
4	0,5	Yes	Yes	Yes	RS-485	RS-485	2	-	**CVM-BD-RED-C2-H**	**M52111**
4	0,5	Yes	Yes	Yes	-	-	-	8	**CVM-BD-420-8-H**	**M52105**
4	0,5	Yes	Yes	Yes	RS-485	RS-485	1	1	**CVM-BD-RED-C420-H**	**M52122**
4	0,5	Yes	Yes	Yes	RS-485	RS-485	-	2	**CVM-BD-RED-420-H**	**M52123**

Coding table

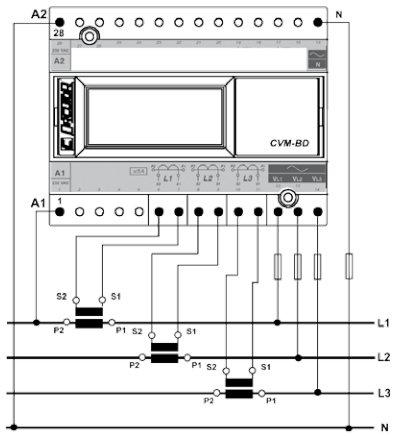
M	5	X	X	X	X	0	0	X	X	X	X	X
Code						Internal Code						
Power Supply Voltage (PSV)			Standard (230 Vac)			0						
			110 Vac			1						
			24..0.120 Vdc			5						
Voltage metered (VM)			Standard (300 V_{ph-n}/520 V_{ph-ph})				0					
			110 V_{ph-n} / 190 V_{ph-ph}				1					
			500 V_{ph-n} / 866 V_{ph-ph}				3					
Current input (CI)			Standard (.../ 5 A)					0				
			.../ 1 A (Only ITF)					1				
Other (only CVM-BD-RED/ BDM)			Standard						0	0		
			RS-232 Communications						0	1		

Dimensions

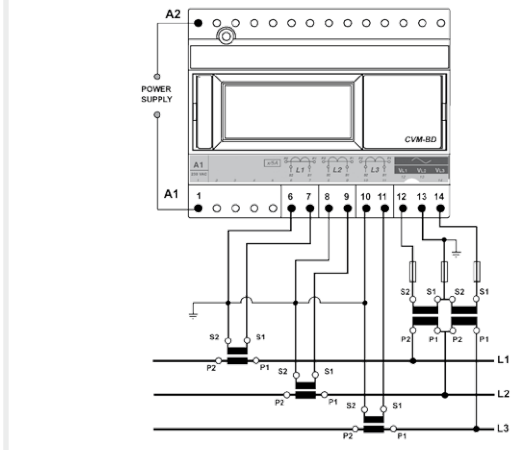


Connections

Three-phase network (low voltage)



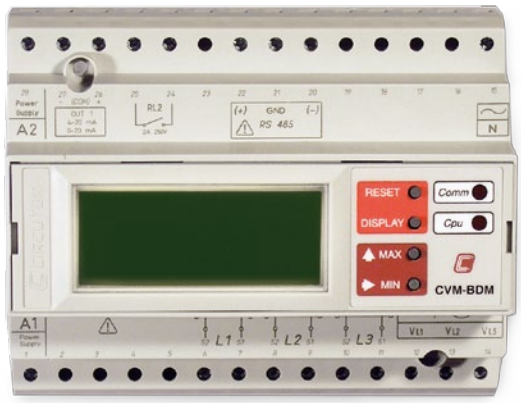
3 current transformers + 2 voltage transformers



See the user manual for other types of connections

CVM BDM

Three-phase power analyzer(balanced and unbalanced) for DIN rail mounting, with internal 1 MB memory



Description

Three-phase power analyzer(balanced and unbalanced) for its assembly on DIN rails, with internal 1 MB memory, measuring in 4 quadrants.

Other features include:

- Current measuring .../5 A
- Measuring of active (kW·h) and reactive (kvarh) energy consumed and generated, both capacitive and inductive. (4 quadrants)
- 8 module DIN rail format
- Adjustable dual kW/MW scale
- Calculates the flicker per phase
- RS-485 communications with Modbus RTU and Zmodem protocol to download files
- Optional second RS-485 port to connect I/O peripherals
- ITF Technology: galvanic insulation protection inputs, depending on the type
- Default page selection
- Optional use of rates with RED or RED-MAX modules

Application

- Application for the control of switchboards and low and medium voltage connection points, where an analyzer must be installed on the DIN rail
- Control of instantaneous, maximum and minimum values of the electrical parameters metered
- Applications where the analyzer's memory must store the electrical parameters measured.

Features

Power supply circuit	230 Vac (-15...+10%). For other values, see the coding table
Consumption	6 V·A
Frequency	45..0.65 Hz
Metering circuit	
Nominal voltage	500 Vac (ph-n) / 866 Vac (ph-ph)
Frequency	40...65 Hz
Current consumption of the circuit	0.6 V·A
Nominal current	... / 5 A
Overload (permanent)	1.2 I_n
Class/Accuracy	
Voltage	0.5 % ± 2 digits
Current	0.5 % ± 2 digits
Power rating	1 % ± 2 digits
Internal memory	1 MB
Ambient conditions	
Operating temperature	-10 ... +50 ºC
Relative humidity (non-condensing)	5 ... 95%
Build features	
Type of box	VO self-extinguishing plastic
Degree of protection	Embedded equipment: IP 41 Terminals: IP 20
Dimensions	140 x 110 x 70 mm (3 modules)
Weight	520 g
Safety	
Designed for CAT III 300/520 Vac installations, in accordance with **EN 61010**. Double-insulated electric shock protection, class II	
Standards	
IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN 61010-1	

CVM BDM

Three-phase power analyzer
(balanced and unbalanced) for its assembly on DIN rails,
with internal 1 MB memory

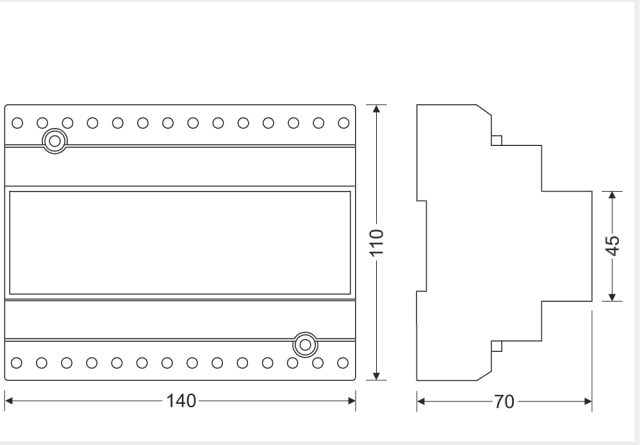
References

Quadrants	Class (V,A)	Clock	THD/D (V,A)	Maximum demand	Flicker meter	Harmonics meter	MODBUS / RTU Communications	Internal memory	Relay output	Output 4...20 mA	Type	Code
4	0,5	Yes	Yes	Yes	Yes	Yes	RS-485	1 MB	-	-	**CVM-BDM**	**M52210**
4	0,5	Yes	Yes	Yes	Yes	Yes	RS-485	1 MB	2	-	**CVM-BDM-C2**	**M52211**
4	0,5	Yes	Yes	Yes	Yes	Yes	-	1 MB	1	1	**CVM-BDM-C420**	**M52212**
4	0,5	Yes	Yes	Yes	Yes	Yes	RS-485	1 MB	-	2	**CVM-BDM-420**	**M52213**

Coding table

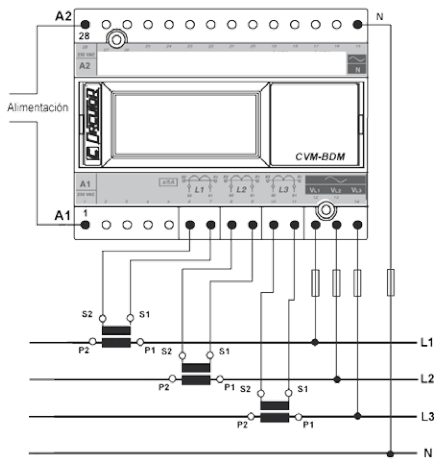
M	5	X	X	X	X	0	0	X	X	X	X	X
Code						Internal Code						
Power Supply Voltage (PSV)						Standard (230 V ac)		0				
						110 V ac		1				
						24..0.120 Vdc		5				
Voltage measurement (VM)						Standard (300 V_{ph-n}/520 V_{ph-ph})			0			
						110 V_{ph-n} / 190 V_{ph-ph}			1			
						500 V_{ph-n} / 866 V_{ph-ph}			3			
Current input (CI)						Standard (.../ 5 A)				0		
						.../ 1 A (Only ITF)				1		
Other (only CVM-BD-RED/ BDM)						Standard					0	0
						RS-232 Communications					0	1

Dimensions

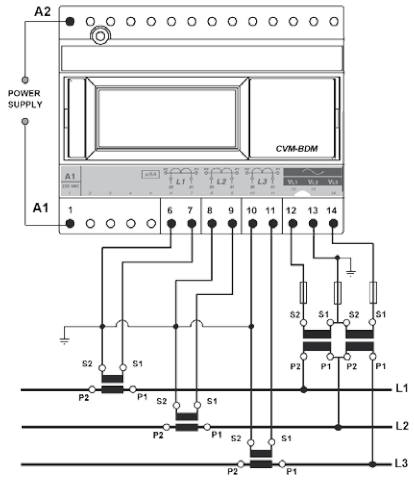


Connections

Three-phase network (low voltage)



3 current transformers + 2 voltage transformers



Power Net

Three-phase power analyzer

Description

- Direct Current measuring, up to 1,000 Aac, depending on the type
- The measure points are composed of a PowerNet and 2 TC-PowerNet

Application

- Control application in distribution panels and low and medium voltage connections, with the need to measure various points with compact units, with no need to install them on DIN rail or panel
- Control of instantaneous, maximum and minimum values of the electrical parameters measured.

Features

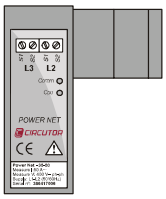
Power supply circuit	400 Vac (-15...+10%) between L1-L2
Frequency	50...60 Hz
Consumption	4.2 V·A
Metering circuit	
Nominal voltage	300 Vac (ph-n) / 520 Vac (ph-ph)
Frequency	45...65 Hz
Nominal current	Up to 1,000 Aac, depending on the model
Voltage consumption of the circuit	0.75 V·A
Overload (permanent)	1.2 I_n
Class/Accuracy	
Voltage	0.5 % ± 2 digits
Current	0.5 % ± 2 digits
Power rating	1 % ± 2 digits
Ambient conditions	
Operating temperature	-10 ... +50 ºC
Relative humidity	5 ... 95%
Build features	
Type of box	VO self-extinguishing plastic
Degree of protection	IP 54
Dimensions	165 x 73 x 33 mm
Weight	220 g
Safety	
Designed for CAT III 300/520 Vac installations, in accordance with **EN 61010**. Double-insulated electric shock protection, class II	
Standards	
IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN 61010-1	

Power Net

Three-phase power analyzer

PowerNet - 0º

PowerNet - 90º



References

PowerNet Units

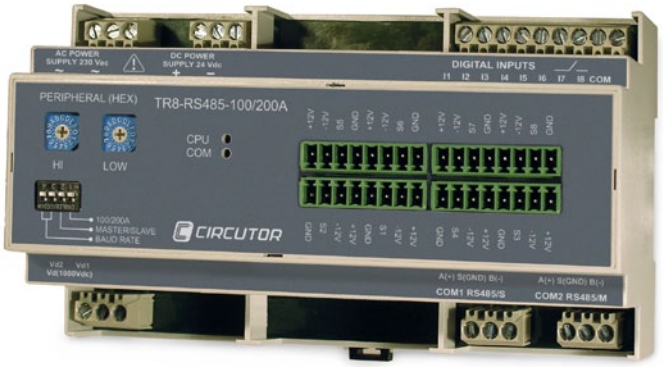
Metering current	Quadrants	Class	Communications	Protocol	Net section ∅ (mm)	Analyzer position with its TC	Type	Code
50 A	2	0,5	RS-485	Modbus / RTU	∅ 35 mm	0º	**Power Net-35-50**	**M52621**
100 A	2	0,5	RS-485	Modbus / RTU	∅ 35 mm	0º	**Power Net-35-100**	**M52622**
250 A	2	0,5	RS-485	Modbus / RTU	∅ 35 mm	0º	**Power Net-35-250**	**M52623**
500 A	2	0,5	RS-485	Modbus / RTU	∅ 70 mm	0º	**Power Net-70-500**	**M52624**
1000 A	2	0,5	RS-485	Modbus / RTU	∅ 70 mm	0º	**Power Net-70-1000**	**M52625**
50 A	2	0,5	RS-485	Modbus / RTU	∅ 35 mm	90º	**Power Net-90-35-50**	**M52611**
100 A	2	0,5	RS-485	Modbus / RTU	∅ 35 mm	90º	**Power Net-90-35-100**	**M52612**
250 A	2	0,5	RS-485	Modbus / RTU	∅ 35 mm	90º	**Power Net-90-35-250**	**M52613**
500 A	2	0,5	RS-485	Modbus / RTU	∅ 70 mm	90º	**Power Net-90-70-500**	**M52614**
1000 A	2	0,5	RS-485	Modbus / RTU	∅ 70 mm	90º	**Power Net-90-70-1000**	**M52615**

TC-PowerNet Units

Metering current	Class	Net section ∅ (mm)	Type	Code
50 A	0,5	∅ 35 mm	**TC-PowerNet- 35-50**	**M52631**
100 A	0,5	∅ 35 mm	**TC-PowerNet- 35-100**	**M52632**
250 A	0,5	∅ 35 mm	**TC-PowerNet- 35-250**	**M52633**
500 A	0,5	∅ 70 mm	**TC-PowerNet- 70-500**	**M52634**
1000 A	0,5	∅ 70 mm	**TC-PowerNet- 70-1000**	**M52635**

TR8

Multi-channel DC voltage and current analyzer



Description

TR8-RS485 is a measurement unit with up to eight DC channels and a voltage channel, handling up to 1,000 Vdc. Current is measured through eight hall effect transformers (transformers used to measure DC current), with a 25 , 100 or 200 A primary.

Aplication

- Photovoltaic applications

Features

Power supply	**Alternating C.**	**Direct C.**
Nominal voltage	230 Vac	24 Vdc =
Power supply tolerance	± 30 %	± 10 %
Frequency	50 Hz	-
Consumption of the equipment without transformers	8 mA / 1.84 V•A	70 mA
Consumption of the equipment with 8 sensors (no load)	32 mA / 7.36 V•A	270 mA
Consumption of the equipment with 8 sensors (with current)	32 mA / 7.36 V•A	270 mA
Operating conditions		
Operating temperature	-35...+65ºC	
Relative humidity	5... 95% RH (non-condensing)	
Maximum operating altitude	2,000 metres	
Protection	IP 20	
TR8-RS485 precision		
Linearity Error	± 0.1 %	Offset Error	0.075 % I_n
Total Error	± 0.5 % I_n	Range	2,5 .... 100% I_n
Resolution Error	± 0.075 % I_n	Voltage Error	1 %
Transformer precision		
Linearity Error (not including offset)	± 0.5%	Offset Drift / Temp.	±1 mV / ºC
Offset Error 25ºC	±10 mV a I_n=0	Thermal Gain Drift	±0.05 % / ºC
Safety		
Category III – 300 Vac (EN61010) Double-insulated electric shock protection class II		

TR8

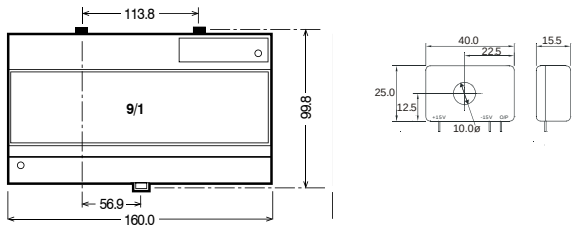
Multi-channel DC voltage and current analyzer

References

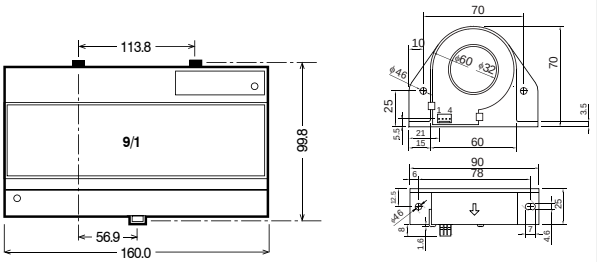
Current	Output	Communications	Description	Type	Code
Equipment, up to 25 A					
25 A	8	RS-485 Modbus/RTU	8 25 A_{dc} channels Connection of up to 2 M/TR8-25Ax4 (8 channels) Voltage measurement of 1000 V_{dc} 8 voltage-free digital inputs	**TR8-RS485-25**	**M54600**
Measurement module for 4 solar strings. Maximum current: 25 A_{dc}				**M/TR8-25 x4**	**M54602**
Equipment, up to 100 / 200 A					
Depends on transformer	8	RS-485 Modbus/RTU	8 100 A_{dc} channels Connection of up to 8 **M/TR8-100A** or **M/TR8-200A** One 1000 V_{dc} voltage input 8 voltage-free digital inputs	**TR8-RS485-100/200**	**M54601**
Measurement module for 1 solar string. Maximum current: 100 A_{dc}				**M/TR8-100**	**M54603**
Measurement module for 1 solar string. Maximum current: 200 A_{dc}				**M/TR8-200**	**M54605**

Dimensions

TR8-25

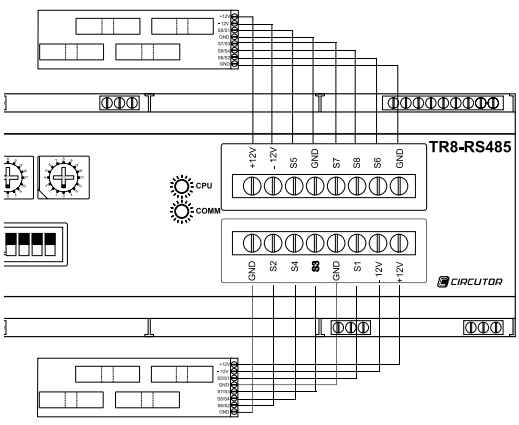


TR8-100/200

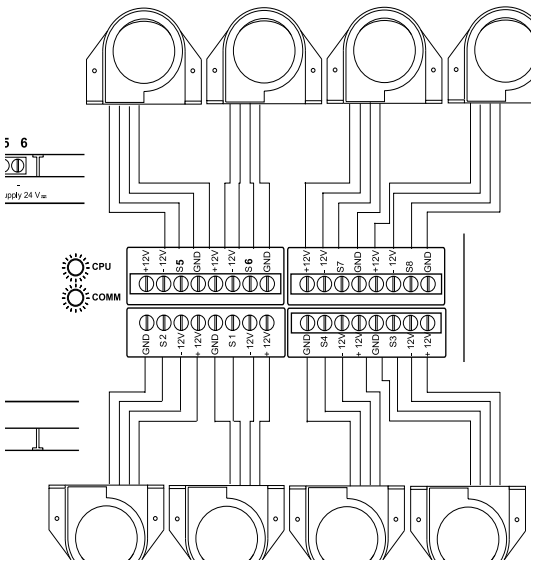


Conections

TR8-25



TR8-100/200



Accessories

CVM-MINI Adaptor

Front panel adaptor

Description

Adaptor for the CVM-MINI for its installation on 72 x 72 mm panels

Application

- For 72 x 72 mm front panel
- Central fixing
- Adjustable on the rear with two straps

References

Type	Code
MINI panel adaptor	M5ZZF1

Converter TCP2RS

Converter of RS-232 / 485 to Ethernet modbus

Description

- Converter of the RS-232 or RS-485 network protocol to Ethernet
- Power supply 85...265 Vac / 115...374 Vdc
- Ethernet speed: 10/100 BaseTX
- RS Bus transmission speed: 1200 bps to 115200 bps

Application

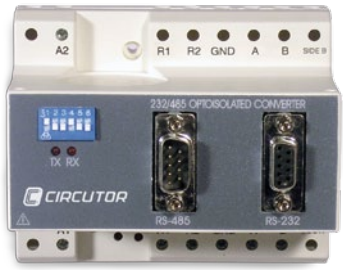
Converting RS-2323 or RS-485 signals to Ethernet or viceversa

References

Type	Code
TCP2RS-RTU, converter of RS-232/485 to transparent Ethernet (TCP or UDP)	M54031
TCP2RS, converter of RS-232 / 485 to Ethernet modbus/TCP	M54032

Converter RS-232/485

RS-232/485 Converter



Description

- Converter of the RS-232 network protocol to RS-485 or viceversa
- The 485 network enables a bus length of 1,200 m
- Power supply 230 Vac
- Transmission speed of 4800 bps to 38400 bps
- Control of the RTS signal (in the intelligent mode)

Application

For any installation with various units connected to an RS-485 network and which must be monitored with an RS-232 connection

References

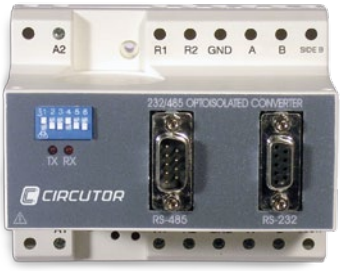
Type	Code
Intelligent converter RS-232/485 (RTS Control)	M54020
Converter RS-232/485 or RS-232/422	M54010

Features

Power supply circuit	230 Vac (between A1-A2)
Consumption	3 V·A
Speed	4800 to 38400 bps
Structure	10-11 bits
R1 and R2	Bridge to connect the final resistor to the line

Accessories

RS-485/RS-485 Amplifier



Description

- RS-485 Network amplifier
- The 485 network enables a bus length of 1,200 m
- Power supply 230 Vac
- Transmission speed: 1200 bps to 19200 bps

Application

For any installation with various units connected to an RS-485 network and which must be monitored with an RS-232 connection

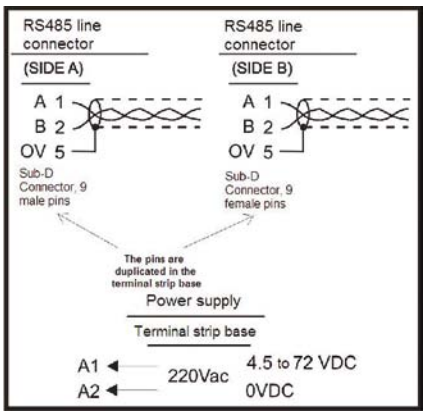
References

Type	Code
RS-485 Amplifier / Repeater	**M54080**

Features

Power supply circuit	12 Vdc
Consumption	60 mA
Operating temperature	0 to 70 ºC
Construction features	
Type of box	Modular. Self-extinguishing plastic
Protection	IP 20
Dimensions	90 x 18 x 70 mm (1 module)

Connection



Communications Speed				
1	2	3	4	BAUDS
ON 11 bits	ON	ON	OFF	19200
	ON	OFF	ON	9600
OFF 10 bits	ON	OFF	OFF	4800
	OFF	ON	ON	2400
	OFF	ON	OFF	1200

USB converter

USB Converter to RS-232 or RS-485

Description

- Converter of the USB network protocol to RS-232 or RS-485
- Power supply through the PC's USB port
- Transmission speed: 4800 bps to 128000 bps

Application

To convert the USB signal to RS-232 or RS-485.

References

Type	Code
USB / RS-485 converter	**M54040**
USB / RS-232 converter	**M54050**

Relation between products and accessories

		LM	TCP2RS	CONVERTER	TP	POWER STUDIO	Adaptor panel
						software Power studio .circutor.com	
		Impulse centralizing unit	RS-232/485 Converter Ethernet	Converter of RS-485 to RS-232	Measuring transformers	Management software	Adaptor for 72 x 72 panel
		See M.3	M54032	M54020	depending on the type	M90231	M5ZZF1
CVM 96		•	•	•	•	•	-
CVM 144		•	•	•	•	•	-
CVM BD		•	•	•	•	•	-
CVM BDM		•	•	•	•	-	-
CVM MINI		•	•	•	•	•	•
CVM NRG 96		•	•	•	•	•	-
CVM k2		•	•	•	•	•	-
POWER NET		-	•	•	-	•	-